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EXAMINER	
YEN, ERIC L	

ART UNIT	PAPER NUMBER
2626	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/811,705	GONG ET AL.	
	Examiner	Art Unit	
	ERIC YEN	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-16 and 18-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11-16 and 18-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the Office Action mailed 7/10/08, applicant has submitted an amendment filed 10/10/08.

Claim 1 has been amended. Claims 10 and 17 has been cancelled. Claims 18-21 have been added.

Response to Arguments

2. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 1 is objected to because of the following informalities:

Claim 1 has been amended to recite "said second speech signal" in the second to last line but no "second speech signal" is previously recited. The examiner has interpreted "said second speech signal" as –a second speech signal--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 21 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 21 contains subtle variations that, while they would probably be construed from the Specification paragraph 26, the variations are still different enough to possibly construe Claim 21 as containing new matter. Specifically the average covariance is claimed instead of the average variance, and also the normalized difference in the Specification includes the bias vector whereas the claim may or may not be the difference between the adjusted mean vector (i.e., it could be the difference between the original mean vector since the adjusted mean vector is not clearly claimed).

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 14 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 depends on cancelled claim 17.

Claim 21, as discussed above, recites "said mean vector" but it is not clear, as claimed, if the difference is calculated with respect to the original mean vector or the

adjusted mean vector, and also it is not clear if applicant meant covariance or variance in "average covariance".

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1, 6-7, 9, 11-12, and 18-20, are rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua (US 6.253,181), in view of Chien ("Quasi-Bayes Linear Regression for Sequential Learning of Hidden Markov Models"), and Juang et al. (US 5,590,242), hereafter Juang.

As per Claim 1, Junqua teaches a method of recognizing a speech signal, comprising:

providing a Hidden Markov Model (HMM) having a state ("new set of HMMs is constructed… [if only Gaussian mean vectors were used]", col. 8, lines 1-6; "probability densities", col. 6, lines 28-39)

providing adjustable parameter to a distribution parameter of said probability density function of a Hidden Markov Model ("new set of HMMs is constructed… [if only Gaussian mean vectors were used]", col. 8, lines 1-6; "probability densities", col. 6, lines 28-39)

detecting a first speech signal including a plurality of frames ("supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36)

using said HMM to recognize said first speech signal ("supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36)

updating said adjustable parameter using said first speech signal ("speech from new speaker is used to train a speaker dependent model", col. 7, lines 15-31; "further adapted model", col. 7, lines 42-50; "other HMM parameters", col. 8, lines 1-6; "Gaussian means", col. 6, lines 15-54)

recognizing a second speech signal with said HMM employing said updated adjustable parameter ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36).

Junqua fails to teach where the adjustable parameter is an adjustable bias, providing a probability density function of said state, said probability density function being associated with a mixture of densities.

Chien suggests where the adjustable parameter is an adjustable bias, providing a probability density function of said state, said probability density function being associated with a mixture of densities ("probability density function... is modeled by... mixture... Gaussian distributions... HMM pdf... HMM mean vector is transformed... shifting bias vector", Introduction, especially upper left paragraph of page 269 and

middle of right column on 268; where the bias vector is taught to be added to the mean vector to obtain the parameters of a new model, and Junqua similarly teaches adjusting Gaussian means, and so Chien suggests where Junqua could use a bias vector as one of the parameters being adapted).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua to include the teaching of Chien of where the adjustable parameter is an adjustable bias, providing a probability density function of said state, said probability density function being associated with a mixture of densities, in order to provide flexible sequential adaptation, as described by Chien (Introduction, especially lower left paragraph of page 269).

Junqua, in view of Chien, fail to teach determining a correction term based on a probability of being in said state with said mixture after observing said first speech signal, and by performing a summation over only said frames of said speech signal, and adding said correction term to said adjustable bias.

Juang suggests determining a correction term based on a probability of being in said state with said mixture after observing said first speech signal, and by performing a summation over only said frames of said speech signal, and adding said correction term to said adjustable bias ("existing bias vector", col. 5, lines 18-25; "a unique solution for the bias estimate", col. 5, lines 38-45; "during training… for each… T frames… nearest neighbor… recomputed", col. 6, lines 31-65; where the changing of a bias value makes a correction to a previously existing bias vector)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Juang of determining a correction term based on a probability of being in said state with said mixture after observing said first speech signal, and by performing a summation over only said frames of said speech signal, and adding said correction term to said adjustable bias, in order to allow implementation in real time without major structural change, as described by Juang (col. 2, lines 32-38).

As per Claim 18, Junqua teaches wherein said probability is based on all speech signals detected prior to said second speech signal ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36; where the adaptation is done using all utterances received for adaptation and a recognition input is received and analyzed based on the adaptation performed with the adaptation utterances).

As per Claim 19, Junqua teaches wherein said second speech signal is a speech signal immediately succeeding said first speech signal ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36; where, if the adaptation is done with one utterance, then the recognition input entered after the training is complete is "immediately succeeding").

As per Claim 20, Junqua teaches wherein said distribution parameter is a mean vector of a Gaussian distribution ("new set of HMMs is constructed… [if only Gaussian mean vectors were used]", col. 8, lines 1-6).

As per Claim 6, Junqua teaches wherein said updating is based on said first speech signal and model parameters of the HMM that are current when said first speech signal is detected ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances…performs speech recognition… passed by the dialogue system to adaptation system", col. 4, lines 24-36).

As per Claim 7, Junqua teaches wherein said updating is based on said first speech singla and information derived form all signals detected prior to said first speech signal ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances…performs speech recognition… passed by the dialogue system to adaptation system", col. 4, lines 24-36).

As per Claim 9, Junqua suggests wherein a length of said first speech signal is arbitrary ("Answer unintelligible… Yes", col. 4, lines 43-54; where some people take longer than others to articulate words).

As per Claim 11, Junqua teaches wherein said first speech signal is an utterance ("Answer unintelligible... Yes", col. 4, lines 43-54; where some people take longer than others to articulate words).

As per Claim 12, Junqua suggests wherein said first speech signal has a fixed length duration ("say... the giraffe is brown", col. 4, lines 43-54; where some people take longer than others to articulate words).

10. Claims 2, 9, and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua, in view of Chien and Juang, as applied to Claim 1 and 12, above, and further in view of Tsuboka (US 5,129,002).

As per Claim 15, Junqua, in view of Chien and Juang, fail to teach wherein said adjustable bias is state-dependent.

Tsuboka teaches wherein said adjustable bias is state-dependent ("calculates a new estimated value of the parameter in state i", column 14, lines 38-39; Tsuboka teaches generating models from speech, which is applicable to Junqua whose adapted models are generated from input speech).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Tsuboka of wherein said adjustable bias is state-dependent, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 16, Junqua teaches wherein said HMM is one of a plurality of Hidden Markov Models for which parameters are updated ("new set of HMMs is constructed... [if only Gaussian mean vectors were used]", col. 8, lines 1-6).

Junqua fails to teach where the parameters are biases.

Chien suggests where the parameters are biases ("HMM pdf... HMM mean vector is transformed... shifting bias vector", Introduction, especially upper left paragraph of page 269; where the bias vector is taught to be added to the mean vector to obtain the parameters of a new model, and Junqua similarly teaches adjusting Gaussian means, and so Chien suggests where Junqua could use a bias vector as one of the parameters being adapted).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua to include the teaching of Chien of where the parameters are biases, in order to provide flexible sequential adaptation, as described by Chien (Introduction, especially lower left paragraph of page 269).

Junqua, in view of Chien and Juang, fail to teach wherein said adjustable bias is state-dependent.

Tsuboka teaches wherein said adjustable bias is state-dependent ("calculates a new estimated value of the parameter in state i", column 14, lines 38-39; Tsuboka teaches generating models from speech, which is applicable to Junqua whose adapted models are generated from input speech).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Tsuboka of wherein said adjustable bias is state-dependent, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 2, Junqua, in view of Chien and Juang, fail to teach wherein said adjustable bias is defined for each state of said HMM.

Tsuboka teaches wherein said adjustable bias is defined for each state of said HMM ("calculates a new estimated value of the parameter in state i", column 14, lines 38-39; Tsuboka teaches generating models from speech, which is applicable to Junqua whose adapted models are generated from input speech).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Tsuboka of wherein said adjustable bias is defined for each state of said HMM, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 9, Junqua, in view of Chien and Juang, fail to teach wherein a length of said first speech signal is arbitrary.

Tsuboka teaches wherein a length of said first speech signal is arbitrary (column 14, lines 33-34, the length varies from one word to R words).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Tsuboka of wherein a length of said first speech signal is arbitrary, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

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As per Claim 13, Junqua, in view of Chien and Juang, fail to teach wherein said duration is 10 minutes.

Tsuboka suggests wherein said duration is 10 minutes (see column 14, lines 33-34, the length varies from one word to R words, R being an arbitrary value that represents any length of time, depending on how many words are spoken and how quickly they are spoken).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Tsuboka of wherein said duration is 10 minutes, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 14, Junqua, in view of Chien and Juang, fail to teach wherein said correction term is a product of a sequence whose limit is zero, whose summation is infinity and whose square summation is not infinity and the summation of quantities weighted by a probability, the quantities based on a divergence of desired model parameter and observed signal.

Tsuboka teaches that said correction term is a product of a sequence whose limit is zero, whose summation is infinity and whose square summation is not infinity (see column 13, equations on lines 5-19, the terms are in the form of 1/N) and the summation of the quantities weighted by a probability, the quantities are based on the divergence of desired model parameter and observed signal (see column 13, equations on lines 5-19, $P(wr \mid \lambda)$).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Tsuboka of wherein said correction term is a product of a sequence whose limit is zero, whose summation is infinity and whose square summation is not infinity and the summation of quantities weighted by a probability, the quantities based on a divergence of desired model parameter and observed signal, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

1. Claims 3, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua, in view of Chien, Juang and Tsuboka, as applied to Claim 15, above, and further in view of Chien et al. (US 6,662,160), hereafter Chien '160.

As per Claim 3, Junqua, in view of Chien, Juang and Tsuboka, fail to teach wherein said adjustable bias is shared among different states of said HMM.

Chien '160 teaches wherein said adjustable bias is shared among different states of said HMM ("bias compensation vector b(λ) is shared by all HMM units", column 4, lines 58-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Junqua, in view of Chien, Juang and Tsuboka, to include the teaching of Chien '160 of wherein said adjustable bias is shared among different states of said HMM, in order to avoid a "data sparseness problem" (CHIEN, column 4, line 61).

As per Claim 4, Junqua, in view of Chien, Juang and Tsuboka, fail to teach wherein said adjustable bias is shared by groups of states of said HMM.

Chien '160 teaches wherein said adjustable bias is shared by groups of states of said HMM ("bias compensation vector b(λ) is shared by all HMM units", column 4, lines 58-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Junqua, in view of Chien, Juang and Tsuboka, to include the teaching of Chien '160 of wherein said adjustable bias is shared by groups of states of said HMM, in order to avoid a "data sparseness problem" (CHIEN, column 4, line 61).

As per Claim 5, Junqua, in view of Chien, Juang and Tsuboka, fail to teach wherein the adjustable bias is shared by all states of the HMM.

Chien '160 teaches wherein the adjustable bias is shared by all states of the HMM ("bias compensation vector b(λ) is shared by all HMM units", column 4, lines 58-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Junqua, in view of Chien, Juang and Tsuboka, to include the teaching of Chien '160 of wherein the adjustable bias is shared by all states of the HMM, in order to avoid a "data sparseness problem" (CHIEN, column 4, line 61).

11. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua, in view of Chien and Juang, and further in view of Zhao (U 5,193,142).

Junqua, in view of Chien, fail to teach wherein said correction term comprises a second factor, based on an averaged normalized difference between a vector representing said second speech signal and said mean vector, said averaged normalized difference weighted by said function of said probability.

Juang suggests teach wherein said correction term comprises a second factor, based on an averaged normalized difference between a vector representing said second speech signal and said mean vector ("existing bias vector", col. 5, lines 18-25; "a unique solution for the bias estimate", col. 5, lines 38-45; "during training… for each… T frames… nearest neighbor… recomputed", col. 6, lines 31-65; where Juang teaches normalizing by the number of frames and a difference to form a new bias vector, where the difference uses a nearest neighbor approach, and so suggests where

the second speech signal [suggested by y] is compared to the nearest neighbor [suggested by z])

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Juang of teach wherein said correction term comprises a second factor, based on an averaged normalized difference between a vector representing said second speech signal and said mean vector, said averaged normalized difference weighted by said function of said probability, in order to allow implementation in real time without major structural change, as described by Juang (col. 2, lines 32-38).

Junqua, in view of Chien and Juang, fail to teach the correction term comprises an average covariance weighted by a function of said probability.

Zhao suggests the correction term comprises a factor based on an average covariance weighted by a function of said probability, and where the normalized difference is also weighted by a function of said probability ("average trace of the covariance matrices", col. 6, lines 9-30; "weights for the mixture densities", col. 2, lines 12-20; where weighting mixture densities suggests weighting anything contributing to the densities, including the bias/correction).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien and Juang, to include the teaching of Zhao of the correction term comprises a factor based on an average covariance weighted by a function of said probability the correction term comprises a factor based on an average covariance weighted by a function of said probability, in order to provide

reliable estimates of parameters and provide computationally efficient weights, as described by Zhao (col. 2, lines 12-20).

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC YEN whose telephone number is (571)272-4249. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EY 1/8/08

/Patrick N. Edouard/
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